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GEOGRAPHICAL RECORD.

ASIA.

PHOTOGRAPHS OF LHASA.—Admittance to Lhasa, the sacred city of the Buddhists, has so long been denied to white men or other foreigners not of the Buddhist faith that the recent publication of photographs of the city and of Potala hill, surmounted by the palace of the Grand Lama, the head of the Buddhist hierarchy, is in the nature of a surprise. *La Géographie*, in its October number, prints a photograph of Potala, on the outskirts of Lhasa, one of a number of pictures taken last summer by a Russian subject, a Kalmuck chief named Ovché Norzounof. It is a view of the south side of the hill, which rises abruptly from the plain to a height of about 300 feet, and is surmounted by the imposing palace of the Grand Lama, 180 feet high, with its surrounding fortifications, temples, and monasteries. The picture, though very interesting, shows little detail, and was probably taken at a distance of a mile or more. *The Geographical Journal*, in its December number, publishes two photographs taken by a member of the Nepal Embassy to Peking. The date of these pictures is not given, but they were probably taken before those of the Kalmuck chief. One is a general view of the city; the other shows Potala taken at the side of the south front of the hill, and so near it that much detail of the palace and its approaches is clearly shown.

These photographs are specially interesting as those of a city which has been forbidden to Christians since the expulsion of the Jesuit fathers in 1760. Only three Europeans, since that event, have succeeded in visiting Lhasa. An Englishman named Manning entered the capital in 1811 disguised as a Hindu doctor. The French missionaries, Huc and Gabet, disguised as Buddhist monks, spent several months in Lhasa in 1846, their long residence in China and their acquaintance both with the Chinese and Tibetan languages enabling them to lull suspicion. Since that time only non-European travellers have been able to reach the city, though many explorers have made the attempt.

Native Asiatic travellers, however, have been there and returned with records sufficient to give a fairly clear idea of the city and its environment. Conspicuous among them have been Indian pundits trained by the Government for geographic work, one of whom, Nain Singh, made two journeys to Lhasa in 1866 and 1873, during

which he determined its astronomical position and its height above the sea. Another, the explorer A-K, or Krishna, in 1879-80 made a chart of the city on a scale of an inch to the mile, which was published in 1885 in *Petermanns Mitteilungen* and is reprinted with the photographs in the above-named magazines. Another Indian explorer, Chandra Das, who visited Lhasa in 1881-82, supplied the most comprehensive account of the city and its people written by any of the Indian explorers. Then came the Russian Kalmucks, Buddhists themselves, who took great interest in everything concerning the sacred city. One of them, Baza-Bakchi, made a pilgrimage from Astrakhan to Lhasa and published an account of his journey in a volume of 260 pages, the narrative being printed both in the Kalmuck and Russian languages. No translation of this work, which is said to contain much fresh information, has appeared in any Western language. Last summer the Kalmuck chief, one of whose photographs *La Géographie* publishes, made his second visit to the city.

Lhasa may be described as oval in form, and about five miles in circumference. The estimates as to its population vary greatly—from 10,000, not including the monks, by Baza-Bakchi, 18,000 by the Austrian traveller Kreitner, 25,000 by the pundit A-K, and 31,000, 18,000 of whom are monks, by Naïn Singh.

DISTRIBUTION OF SIBERIAN PRODUCTS.—The report of the Siberian Railroad for 1900 throws considerable light upon the economic condition of that country. The total grain shipments by the railroad amounted to 17,575,023 poods, wheat representing more than half of the quantity of cereals shipped. Nearly two-thirds of the grain was taken out of the country, the balance being distributed along the line of the railroad as far east as the stations on the Trans-Baikal division. Of the export grain, 3,588,000 poods were sent to the mining regions of the Urals, which find the Siberian wheatfields a nearer source of supply than those of southern Russia; 3,244,742 poods went mainly to other markets in the eastern part of Russia; 2,123,190 poods went to Baltic ports for export, mainly to Germany and Great Britain; and 1,430,660 poods went through north-east Russia by river and canal to Archangel for local demand and, to a small extent, for exportation to north-west Europe. This information, of course, does not apply to the large amount of grain shipped eastward by the water routes, but it will serve as an approximate indication of the proportionate distribution of the export grain of Siberia.

Nearly all the cereals are produced in the southwestern part of the country, and are received for shipment at railroad stations along the western 325 miles of the line. Most of the wheat is grown on the rich soil of the southern province of Semipalatinsk, and is sent down the Irtysh river, a part of it being transferred to the railroad.

Only 9,705 head of cattle were sent into Russia from the pastures around Kurgan and Petropavlovsk in the southwest, most of them going to the garrisons at St. Petersburg and Krasnoye-Selo, the military station southwest of the capital. A great deal of butter from the same districts was sent either to central Russia or to the ports for export.

Tea from China is the next most important article of freight. Most of the tea is still carried in summer by the water routes, which are well developed in Siberia, considering the comparative newness of the country. The Ob and Irtysh are navigable almost to their sources, and canalized rivers and canals supply east and west connections, so that grain and other products are carried in large quantities by water to the Russian frontier. It is interesting to observe that the water routes are still more extensively employed than the railroad. In 1890, only one-fifth of the iron and steel imported, one-tenth of the refined sugar, and one-third of the manufactures were carried by rail.

The detailed statistics graphically illustrate the predominance of agriculture over other industries; the special development of agriculture in the western and southwestern districts of Ishim, Kurgan, and Semipalatinsk; the formidable competition offered by the water routes in the short summer season; and the rapidly growing importance of the cities situated both on the navigable waters and the railroad (Condensed from the *Bulletin du Comité de l'Asie Française*, Nov. 1901).

AFRICA.

TROGLODYTES OF KATANGA.—A paper from the pen of Captain Lemaire, the African explorer, printed in *La Géographie* (Nov., 1901), seems to show that the reports of extensive limestone caverns in the Katanga district of the Congo Free State, inhabited by many troglodytes, have been exaggerated. These reports appear to have been started by a book entitled *Garenganze*, written by the missionary F. S. Arnot, who said (p. 198):

“Going northwest nearly to the Kalasa mountains, I had a good view of the famous cavern mountain, which is inhabited. The

great cave has two entrances, a distance of five miles or more apart, and within is a running stream. There are also many smaller caves and dens in this mountainous country in which the natives hide themselves. The entrances to these caves look like rabbit-holes. They form such perfect retreats that Msidi could extort no tribute from these people. Near the mouths of the caves they have millet gardens. They greatly feared my inspecting the caves, and I had to promise that I would not do so or none would have come near me."

A communication to the Belgian Royal Geographic Society (May 4, 1893), describing another cave, told of "troglodytes living in long galleries dug in the almost perpendicular wall of a cliff."

Lemaire's researches included a number of these limestone caverns, only one or two of which appear to be of considerable extent, and none of them is inhabited. At the village Molobo are seventy-five huts surrounded for protection by two or three rows of poles, which also enclose the entrance to two small caves that are reached by rough ladders. It may be that these underground galleries connect with a larger one, but none is inhabited in ordinary times. The caverns of Ki-Bué, three miles from Molobo, are interesting. Ki-Bué, on the right bank of the Lu-Fira river, is perched on the top of an almost perpendicular wall, in which are the entrances to the caves that serve as a refuge in case of trouble. The path leading to the largest cavern is dangerous, as it would be easy to fall from it into the river. The roof has been discolored by smoke; a proof that it is often occupied. Upon taking refuge in this cave the natives may consider themselves safe from enemies. But nothing has been done to improve the cavern for permanent residence. In time of peace the natives occupy the huts of their village. Lemaire saw neither women nor children; they were undoubtedly hiding in the caverns. The explorer says that while he believes the natives did not reveal to him all the secrets of their caverns, he saw enough to disprove the legend of "troglodytes" living in them.

Capt. Lemaire also explored other caverns, and he reached the conclusion that none of the natives is a troglodyte, properly so called. The tribes live in the midst of their fields; but in times of war they run to earth and keep quiet till the danger is over.

The Sombwe cavern, of which Arnot wrote, is composed of a series of fissures leading to a spacious hall, very humid and entirely dark.

The most important cavern found (Ki-Amakélé) is reached by

two circular cavities twenty to thirty-five feet deep, which communicate with the cavern. The descent is made by a ladder into a passage-way leading to a large hall decorated with calcareous formations. This hall has been closed by a recent fall of rock, but before the accident occurred Mr. Delvaux, exploring it, ascertained that it was large enough to hold 200 persons. A gallery leading from this hall could not be entered, as it was filled with deadly gas. The second entrance to this cavern leads to a nearly square room about 170 feet in length and width, and eleven feet high. This gallery is well ventilated, having fissures in the ceiling which admit the air. But the cavern is not used as a place of habitation.

RAILROAD ON THE UPPER CONGO.—The Government of the Congo Free State has decided to build about 800 miles of railroad from Stanleyville (formerly Stanley Falls), so as to unite the Congo by steam both with the Nile and with Lake Tanganyika. Engineers have been engaged for about two years in making surveys for the projected railroad to the Nile at its outlet from Albert Nyanza. The line will extend through the forest region direct to the extreme north of Lake Albert at Mahagi. It will be about 450 miles in length.

The second line will be divided into sections connecting navigable stretches of the Congo above Stanleyville. The first section will skirt the rapids for 120 miles, as far as Ponthierville, whence communications will be continued by water for 240 miles to the cataract below Nyangwe. The rapids will be doubled by a second section to the navigable reach above Nyangwe. The third section of the road will connect the upper Congo with Lake Tanganyika. It was decided from the first that these great improvements should permanently be the property of the State.

THE TELEGRAPH IN CENTRAL AFRICA.—Mr. Mohun, formerly the American Consul at Loanda, West Africa, was engaged by the Congo Free State in 1898 to establish a telegraph line between Lake Tanganyika and the Congo River. He has completed the work and returned to Belgium. His wire and equipment were carried by steamboat, porters, and wagons from the mouth of the Zambesi to Lake Tanganyika, where he began the erection of the line at Sungula, extending it west along the caravan route to New Kasongo, on the upper Congo. He says that New Kasongo has become one of the most important trading points in Central Africa. It is visited by thousands of natives, Arabs and a few Europeans, who come to this centre to sell and to buy. Merchants of Zanzibar send cara-

vans with foreign commodities to this place, and all the country around it for twenty days' journey is commercially tributary to the town (*Mouve. Géog.*, 1901, No. 45).

NAVIGATION ON THE NIGER.—*La Revue Française de l'Etranger et des Colonies* (1901, p. 370) says that the Lenfant Mission has arrived at Say, on the upper Niger, with freight carried up the river from the sea. This is the first time that the Niger has been used for freight carriage from the ocean far into the interior, it being supposed that the difficulty of navigation through the rapids would render such service impossible. Captain Lenfant was instructed to occupy the regions between the Niger and Lake Chad which were transferred to France by the Franco-English Convention of 1898. Navigation on the lower Niger, though in British territory, is free to all nations, and the French accordingly desired to ascertain whether they might utilize this all-water route to the far interior. Lenfant had no special difficulty in ascending the river to Badjibo in lighters with 8,000 cases of food and other supplies. He ascended the rapids above Badjibo in April and May last with sixty tons of merchandise in fifteen wooden lighters. The river being low, it was a very unfavourable time for passing the rapids, and the difficulties were formidable, progress being possible only by hauling on tow-lines fastened to rocks ahead. The enterprise, however, was successfully carried out. It is believed that the experience now gained will lessen the difficulties of further attempts to navigate these waters, and that the economic value of this route to the new French territory will be important. Captain Lenfant proposed to make a second ascent in August, at high water, when he expected that an easier passage might be made.

A SUBTERRANEAN NILE.—The depression of the Oued-Rhir, in the Algerian Sahara, directly south of the Auras Mountains, may be called a channel in a plateau of limestone and sandstone, running north and south, and bordered by escarpments about twelve miles apart at the edges of the plateau. The depression, about ninety-three miles in length, is fertilized by a subterranean Nile, turning the desert into a garden. It is the most important oasis in the Algerian Sahara, its verdant aspect being in striking contrast with the whitish waste of the plateau around it. The chief settlement in this depression is Tugurt, and around it are nearly 200,000 date-palms. Nearly all of the inhabitants are of the Ruara tribe, an industrious people, well-sinkers and date-growers. To the north are the Atlas ranges of Algeria, the effective barrier that prevents

Mediterranean rains from reaching this region. The only sources of humidity are dew and the rain and snow that fall on the wide mass of the Auras Mountains. These waters disappear in the sandy soil on the southern slope of the mountains, and this is the origin of the unfailing supply of water that underlies the depression of the Oued-Rhir. The depth at which the water is found varies with the distance below the surface of the impermeable stratum on which it flows. The natives have for ages sought to make this underground resource available; but with their rudimentary methods they were able to reach it only when the superficial strata were neither too thick nor too hard.

In 1856, Col. Desvaux began to tap this water source by boring, and the results conferred great blessings upon the whole district. Between 1857 and 1896, 777 artesian wells, 320 of which are spouting wells, became sources of life to the surrounding lands. The combination of water and sun developed the great date-raising industry of the Oued-Rhir, which is now one of the most productive parts of Algeria.

EUROPE.

INTERIOR NAVIGATION IN GERMANY.—*La Géographie* (Nov., 1891), deriving its information from the diplomatic and consular reports to the French Government, says that the Rhine has to-day the largest traffic of all European rivers. It also carries maritime navigation farthest inland. Cologne has become a seaport like Düsseldorf and Duisburg. The movement of sea vessels on the Rhine is comparatively important. One line of steamers plies from Duisburg and Düsseldorf, in the Rhine-Westphalia industrial district, to the Baltic, importing lumber and exporting coal and iron. A line of three steamers makes regular trips between Ruhrort, Düsseldorf, and Cologne on the Rhine, and London. Another line of eighteen small steamers connects lower Rhine cities with ports on the North Sea and the Baltic as far as Riga, Russia. Another line of four steamers plies between Cologne and St. Petersburg, the same company also having steamers regularly in the trade between Cologne and Palermo. Three steamers are in service between Cologne and Hamburg. The barge trade between Cologne and Baltic ports is also important, seaworthy barges of from 600 to 1000 tons being towed by powerful tugs. Ruhrort, the great coal port of the Ruhr coalfields, with a commercial movement of about 6,000,000 tons a year, is the most active port on the Rhine. No other interior port of Europe has so large a traffic. The commercial move-

ment of the other Rhine ports in 1900 was: Duisburg, with Hochfeld, 5,544,000 tons; Mannheim, 4,704,000 tons, of which 403,000 tons came from the Neckar; Ludwigshafen, 1,447,000 tons; Mayence, with Gustavsburg, 1,131,000 tons; Frankfort-on-the-Maine (which may be considered a Rhine port), 1,687,000 tons; Cologne-Deutz, 1,019,000 tons; Düsseldorf, 619,000 tons; finally, Strassburg, 609,000 tons.

The Elbe comes next after the Rhine. The traffic of 1900 between Hamburg and the upper river amounted to 5,440,000 tons. On the Oder the city of Breslau is the most active port, with 1,313,000 tons local traffic and 996,700 tons transit trade. The canal between the Spree and the Oder carried 1,679,000 tons of freight. The movement on the Swine river amounted to 508,000 tons.

During the year 1899-1900 the Kaiser Wilhelm Canal was navigated by 26,279 vessels of 3,488,767 tons. This is an increase of 463 vessels and 370,927 tons over the preceding year.

SURVEYING THE BRITISH LAKES.—Dr. H. R. Mill, in his presidential address to the geographical section of the British Association at Glasgow, announced that Sir John Murray and Mr. Laurence Pullar had decided to complete the bathymetrical survey of all the fresh-water lakes of the British Islands. Mr. Pullar has made over to trustees a sum of money sufficient to enable investigation to be commenced at once and to be carried through in a comprehensive and thorough manner. All the lakes will be sounded and mapped as a preliminary to complete limnological investigation. The nature of the deposits, the chemical composition of water and its dissolved gases, the rainfall of the drainage areas, the volume of the inflowing and outflowing streams, the fluctuations in the level of the surface, the seasonal changes of temperature, and the nature and distribution of aquatic plants and animals will all receive attention (*The Geog. Jour.*, Oct., 1901).

THE GERMAN COLONIAL SCHOOL.—This institution, established two years ago at Witzenhausen to fit young men for responsible positions in the Colonies, has thus far sent twenty-five of its pupils to East Africa, South Africa, the Cameroons, Togoland, and other tropical regions. During the last term the school had forty-six pupils. The theoretical instruction includes colonial government, commerce and communications, chemistry, geology, zoology, tropical hygiene, and tropical agriculture. The practical instruction includes work in the field, shop, and laboratory relating to

agriculture, gardening, chemistry, wood and stone working, blacksmithing and carpentry. A model farm of 425 acres is part of the school property. This school is one of the agencies that are contributing to the intelligent development of the German colonies. Others are the experimental stations maintained by the Government in East and West Africa and New Guinea; and the coffee, cotton, tobacco, and other plantations which are being opened by colonial societies in the foreign possessions.

SOUTH AMERICA.

PROGRESS ON THE TAPAJOS RIVER, BRAZIL.—The Tapajos, the third largest southern affluent of the Amazon, is still imperfectly known. Navigation is confined to the lower section. Unless railroads are built around the cataracts, the Tapajos can never become a means of communication between the Amazon and the far interior. There is a fortnightly steamboat service from Pará, and two or three trips a month are made by a steamer from Santarem, at the mouth of the river, to the first cataract, a distance of 230 miles. Commerce is developing, especially in rubber. New settlements have been founded, which as yet are indicated on only a few of the best maps, while towns still shown on the maps have disappeared. Itaituba, on the middle river, seems destined to be the largest settlement. It lies in the centre of a region that is very rich in rubber, and its commercial importance is already larger than that of Santarem. In the region to the south many settlements have sprung up in the past few years whose inhabitants devote themselves to the rubber industry.

AUSTRALIA AND NEW CALEDONIA.

SUBTERRANEAN LAKES IN AUSTRALIA.—Natives in the service of Mr. G. B. Scott have discovered subterranean lakes in the Eucla district, north of the great Australian Bight. The *Scottish Geographical Magazine* (Nov., 1901) says these lakes are sixteen miles west of those discovered by Mr. Juncker. They contain an apparently unlimited supply of good drinking water at a depth of thirty feet from the surface, and in country providing good indigenous bush feed for cattle. This fresh discovery emphasizes the possibility of revolutionary development in Central Australia, which may yet make feasible an amount of inland settlement of which we have not previously conceived in that drought-stricken area. The discovery also casts some light upon the problem of what becomes of the

Central Australian waters not lost by evaporation and of the rivers which disappear so provokingly. The solution of this problem would probably go far to settle the question of utilizing the country, whose only lack is water.

A RAILROAD IN NEW CALEDONIA.—The first railroad in the smaller islands of the Pacific, except in Hawaii, is now building in the French colony of New Caledonia, the work beginning on August 17th last. The road will skirt the west coast, connecting Noumea, the capital, with Bourail, the most important agricultural centre of the island. The governor of the colony, M. Feillet, says that the railroad, which will be about ninety miles long, will make it much easier to develop the cobalt, nickel, and other rich mineral resources, and that Indian coolies will be imported to augment the labour needed in the mines. The Nickel Company proposes to extend the railroad further north to Koné.

POLAR REGIONS.

SOME UNEASINESS is felt in Norway with regard to Capt. Sverdrup's party in the *Fram*; and it has been proposed to send an expedition to the East Greenland Coast in search of the missing ship.

The *Fram* was provisioned for five years—a fact which seems to have been overlooked in noting Capt. Sverdrup's failure to establish caches along the line of his route, so far as known—and there seems to be little reason to fear disaster to so staunch a vessel, commanded by the able seaman who carried her through all the perils of her first three years in the frozen seas of the North.

IT IS ANNOUNCED that a Norwegian expedition, under the command of Mr. Amundsen, one of the party on board the *Belgica*, will be sent to determine the position of the north magnetic pole.

THE RUSSIAN-SWEDISH measurement of an arc of the meridian in Spitsbergen is still unfinished. *Petermanns Mitteilungen*, 47 Band, IX, reports that the Russian party had succeeded in determining all the points of triangulation, but that the Swedish division had been hindered by the ice and had been unable to complete its work, which must be taken up again in 1902, if, as is to be expected, the Diet makes the necessary appropriation.

MR. W. S. BRUCE writes in the *Scottish Geographical Magazine*, for November, that he has been successful in raising sufficient funds for one complete year's work in Antarctic exploration, and that the Scottish Antarctic Expedition will leave Scotland in the autumn of 1902. This delay he looks upon as a decided gain, since it allows time for thorough preparation and for special training.

One change will be made in the plan: there will be no winter station established. Mr. Bruce's opinion is that the greatest present need is a free-moving ship constantly doing work on the *Challenger-Valdivia* lines for a whole year. If the ice conditions are favourable, the ship will push as far southwards as is prudent; but in no case is it Mr. Bruce's intention to allow the ship to be caught in the ice. The expression is emphatic; but the ice has been known to take no note of intentions.

FIELD ICE NEAR CAPE HORN.—The sugar-laden bark *Nuuuanu*, which left Honolulu in June and arrived at Philadelphia early in November, was caught in field ice in September while rounding Cape Horn. The ice extended as far as could be seen to the south, with fair weather and a smooth sea.